REMARKS

The foregoing amendment amends claims 1, 9 and 12 and adds claims 20-25. Pending in the application are claims 1-12 and 14-25, of which claims 1, 9, 12, 20, 21, 22, 24 and 25 are independent. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Claim 1 is amended to specify that the high-pressure tank discharges hydrogen gas at a pressure of about 25 MPa. Support for the amendment can be found throughout the application as originally filed, at least for example on page 10, lines 9-11 and on page 15, lines 23-25.

Claim 9 is amended to specify that the high-pressure tank stores hydrogen gas at a pressure of about 25 MPa, as specifically set forth on page 10, lines 9-11 and on page 15, lines 23-25 of the original specification.

Claim 12 is amended to specify that the mechanism includes a hydrogen-discharge means for discharging hydrogen having been occluded in the hydrogen-occlusion alloy and supplying the discharged hydrogen to the fuel cell as fuel. Support for the amendment can be found throughout the application as originally filed, at least, for example, on page 5, lines 14-19, page 34, lines 11-13, page 19, line 18 through page 20, line 5 and as shown in Figures 5 and 10.

New claims 20-25 are added to more fully capture the instant invention. Claim 20 is directed to the subject matter of original claim 1, and further specifies that the warming-up apparatus includes a branched pipe connecting the high-pressure tank to the hydrogen-occlusion alloy tank and the fuel cell, as recited on page 15, lines 16-20 of the originally filed specification and as shown in Figure 5.

New independent claim 21 is directed to the subject matter of original claim 1 and further recites a three-way valve for selectively switching between a passage for passing hydrogen between the high-pressure tank and the hydrogen-occlusion alloy tank and a passage for passing hydrogen between the high-pressure tank and the fuel cell. Support for the additional subject matter of claim 21 can be found throughout the application as originally filed, at least, for

example, on page 36, line 17 through page 37, line 8 of the originally filed specification and as clearly shown in Figure 10.

New independent claim 22 is directed to the subject matter of claim 1 and further specifies that the components of the warming-up apparatus are disposed on board an electric vehicle, as set forth throughout the application as originally filed, in particular on page 13, line 5 through page 14, line 8 and as shown in Figure 4. Claim 23 depends from claim 22 further specifies that the high-pressure tank and the hydrogen-occlusion alloy tank are crosswise placed on the upper portions of the rear wheels of the vehicle, as shown in Figure 4 and particularly set forth on page 13, lines 19-21 of the original specification.

New independent claim 24 is directed to the subject matter of original claim 1 and further specifies that the high-pressure tank is formed of a fiber reinforced plastic, as set forth on page 15, lines 21-23 of the specification as filed.

New independent claim 25 is directed to the subject matter of original claim 1 and further specifies that the hydrogen-occlusion alloy tank in the warming-up apparatus is formed of an aluminum alloy having higher heat resistance and higher heat conductivity than the high-pressure tank, as specifically set forth on page 18, lines 12-15 of the specification as originally filed. *No new matter is added.*

Amendment and/or cancellation of the claims is not to be construed as an acquiescence to any of the objections/rejections set forth in the instant Office Action, and were done solely to expedite prosecution of the application. Applicants reserve the right to pursue the claims as originally filed, or similar claims, in this or one or more subsequent patent applications.

35 U.S.C. §112 Rejections

In the Office Action, the Examiner rejects claims 1-11 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner, upon additional review, considers the recitation in independent claims 1 and 9 specifying that the high-pressure tank stores compressed hydrogen gas at a pressure of at least about 1 MPa at a temperature of about 35° Celsius to be unsupported in the original specification.

Applicants respectfully disagree, and submit that the recitation is inherently supported in the original disclosure of the present application. The term "high-pressure tank for storing hydrogen" was well known in the art at the time of the invention to be a tank that stores compressed hydrogen gas at a pressure of at least 1 MPa when stored at a temperature of about 35 degrees Celsius. Applicants previously submitted supporting documents showing that, by definition, a "high-pressure tank" stores compressed hydrogen gas at a pressure of at least 1MPa. However, the Examiner now considers this limitation to lack support in the original disclosure. In particular, the Examiner does not consider that high-pressure tanks inherently require hydrogen gas to be *compressed*, and therefore considers that the metal-hydride tank of the JP 60-68 A reference, which stores hydrogen in an alloy and can withstand pressures up to about 7MPa, to be a "high-pressure tank" as set forth in the claims.

However, in order to expedite allowance of the application, Applicants have amended claims 1 and 9 to specify that the high-pressure tank discharges and/or stores hydrogen gas at a pressure of about 25 MPa, which has clear support in the specification. As recognized by the Examiner, the tank described in the JP60-68 A reference can only withstand pressure up to about 7MPa, which is significantly less than 25 MPa.

The Examiner also rejects claims 1-8 under 35 U.S.C. 112, second paragraph, as being indefinite. Applicants previously amended independent claim 1 to address the Examiner's concern that the recitation "the hydrogen discharged from said high-pressure tank" lacks antecedent basis. Applicants' prior Amendment and Response to Office Action filed on November 24, 2004 removed the word "the" from the recitation, and pending claim 1 now provides proper antecedent basis for all terms. Therefore the rejection of claims 1-8 under 35 U.S.C. 112, second paragraph should be withdrawn.

35 U.S.C. §102 Rejections

In the Office Action, the Examiner cites and applies new art to reject claims 1-12 and 14-19. In particular, the Examiner rejects claims 1-12 and 14-19 under 35 U.S.C. §102 as being anticipated by the WO00/58529 Okada reference. Applicants traverse the rejection and submit that claims 1-12 and 14-19 distinguish patentably over the cited Okada reference.

According to the Examiner, because the Okada reference discloses a fuel cell apparatus comprising a fuel cell 1, a hydrogen fuel tank 4 having a hydrogen storage metal alloy, a heat exchanger 5 and a high-pressure hydrogen cylinder for supplying hydrogen to the hydrogen fuel tank, the claims are anticipated. However, Applicants note several distinctions between the Okada reference, which is concerned with supplying hydrogen from the hydrogen fuel tank to the fuel cell in order to operate the fuel cell by applying heat to release hydrogen stored therein, and the present invention. In particular, the Okada reference does not teach, and in fact teaches away from, transferring heat to a fuel cell in order to warm-up the fuel cell, which is the focus of the present invention.

The Okada reference discloses controlling the temperature of a hydrogen fuel tank 4 by circulating a cooling/warming medium around the hydrogen fuel tank 4 during absorption of hydrogen and consequential heating of the hydrogen fuel tank 4 to *cool* the hydrogen fuel tank 4. In addition, the Okada reference employs the cooling/warming medium to heat the hydrogen fuel tank 4 if necessary to facilitate release of hydrogen, which is then supplied as fuel to the fuel cell 1. The heat transferred to the cooling/warming medium from the hydrogen fuel tank 4 is *not* transferred to the fuel cell 2, but rather exchanged with the outside air, so that the heat does not *reach* the fuel cell. In fact, the Okada reference makes no mention of transmitting heat to a fuel cell at all. In contrast, the present invention is concerned with *storing* hydrogen in a metal hydride tank to *release* heat, which is then applied to warm-up the fuel cell.

According to the Examiner, the fuel cell is inherently warmed up by the circulating coolant system during the exchange of heat between the hydrogen storage tank and the cooling/warming medium. However, the Examiner appears to be mistaken, as no heat reaches the fuel cell from the hydrogen storage tank. In particular, valves V5, V6 and V7 are closed at this time to *prevent* heat exchange with the fuel cell, and the heat exchanger exchanges heat from the hydrogen fuel tank 4 with the outside air to *prevent* heating of the fuel cell. These valves are only open to transfer heat *away* from the fuel cell, not to transfer heat to the fuel cell.

Therefore, because independent claims 1, 9 and 12 all specify that heat from the hydrogen occlusion alloy generated by the occlusion of hydrogen is transferred to the fuel cell, the Okada reference does not anticipate the claimed invention.

35 U.S.C. §103 Rejections

The Examiner also rejects claims 12, 14, 15, 18 and 19 under 35 U.S.C. §103(a) as being obvious over the previously-cited JP 60-68 A reference in view of the Kralick reference, the Aldhart reference and/or the Pratt reference. As recognized by the Examiner, the JP 60-68 A reference does not disclose that the solvent for exchanging heat is water. However, the Examiner considers the use of water as a medium for heat exchange to be obvious in view of the other cited references. In addition, the Examiner considers that the JP 60-68 reference discloses in claim 2 that a solvent for transferring heat to the fuel cell passes outside of a tank containing a hydrogen-occlusion alloy.

Applicants respectfully disagree with the Examiner's position. However, to expedite prosecution and allowance of the claims, Applicants have amended claim 12 to specify that the alloy tank includes a hydrogen discharge means for transferring hydrogen to the fuel cell for power generation. The JP 60-68 clearly does not disclose that hydrogen is transferred from the metal hydride tank to the fuel cell. Rather, hydrogen is only transferred between the two metal hydride tanks and not to the fuel cell. Therefore, claims 12, 14, 15, 18 and 19 distinguish patentably over the cited references.

Dependent claims

The dependent claims recite additional features not taught or suggested in the cited references. For example, the cited references fail to disclose that a system is shifted into a warming-up mode *depending on the temperature of the cooling water* of the fuel cell, as set forth in claims 3, 11, 14 and 19.

New Claims

New claims 20-25 are added to more fully capture the instant invention. The new claims recite additional distinct structural differences between the hydrogen fuel battery of Figure 21 of Okada and the warming-up apparatus for a fuel cell according to the present invention, as well as between the combination of the JP 60-68 reference and the Kralick reference and the present invention.

For example, none of the cited references teaches or suggests that hydrogen from a high-pressure tank can be directly supplied to a fuel cell and/or a hydrogen-occlusion alloy tank. Rather, in the Okada reference, the hydrogen storage tank is the sole source of hydrogen for the fuel cell. Hydrogen must pass from the high-pressure cylinder to the hydrogen storage tank before being supplied to the fuel cell in Okada. In addition, as described above, the JP 60-68 reference does not disclose transferring hydrogen from the metal hydride tank to the fuel cell. In contrast, an embodiment of the system of the present invention employs a branched pipe from the high-pressure tank to supply hydrogen directly to the fuel cell *as well as* the metal hydride tank. Therefore, independent claim 20, which recites a branched pipe having a branch for connecting the high-pressure tank to the fuel cell and a branch for connecting the high-pressure tank to the hydrogen-occlusion alloy tank, distinguishes patentably over the cited references.

In addition, the recitation of a three-way valve for selectively switching between a passage for passing hydrogen between the high-pressure tank and the hydrogen-occlusion alloy tank and a passage for passing hydrogen between the high-pressure tank and the fuel cell, as set forth in independent claim 21, is also not disclosed in the cited references.

The cited references do not disclose that the described systems are used in a vehicle, as set forth in independent claim 22. In particular, the cited references fail to disclose the crosswise placement of a high-pressure tank and a hydrogen-occlusion alloy tank on the upper portions of the rear wheels of a vehicle, as set forth in dependent claim 23. Even if the system of Okada is used in a vehicle, it is clear that the high-pressure hydrogen cylinder is a *separate* supply tank that is not part of the system and could not be on-board a vehicle employing the system of Figure 21 of Okada.

In addition, claim 24 specifies that the high-pressure tank is formed of a fiber reinforced plastic, a feature neither taught nor suggested in the cited references.

Claim 25 specifies that the hydrogen-occlusion alloy tank is formed of an aluminum alloy having higher heat resistance and higher heat conductivity than the high-pressure tank, which also further differentiates over both the Okada reference and the JP 60-68 A reference.

CONCLUSION

For at least the foregoing reasons, claims 1-12 and 14-25 are patentable over the cited references. Applicants also submit that the pending claims are also clear and definite. In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue. If the above response is not deemed to place this case in condition for allowance, the Examiner is urged to call the Applicants' representative at the telephone number listed below.

Applicants believe no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 12-0080, under Order No. IIW-016 from which the undersigned is authorized to draw.

Dated: August 25, 2005

Respectfully submitted,

By _____

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